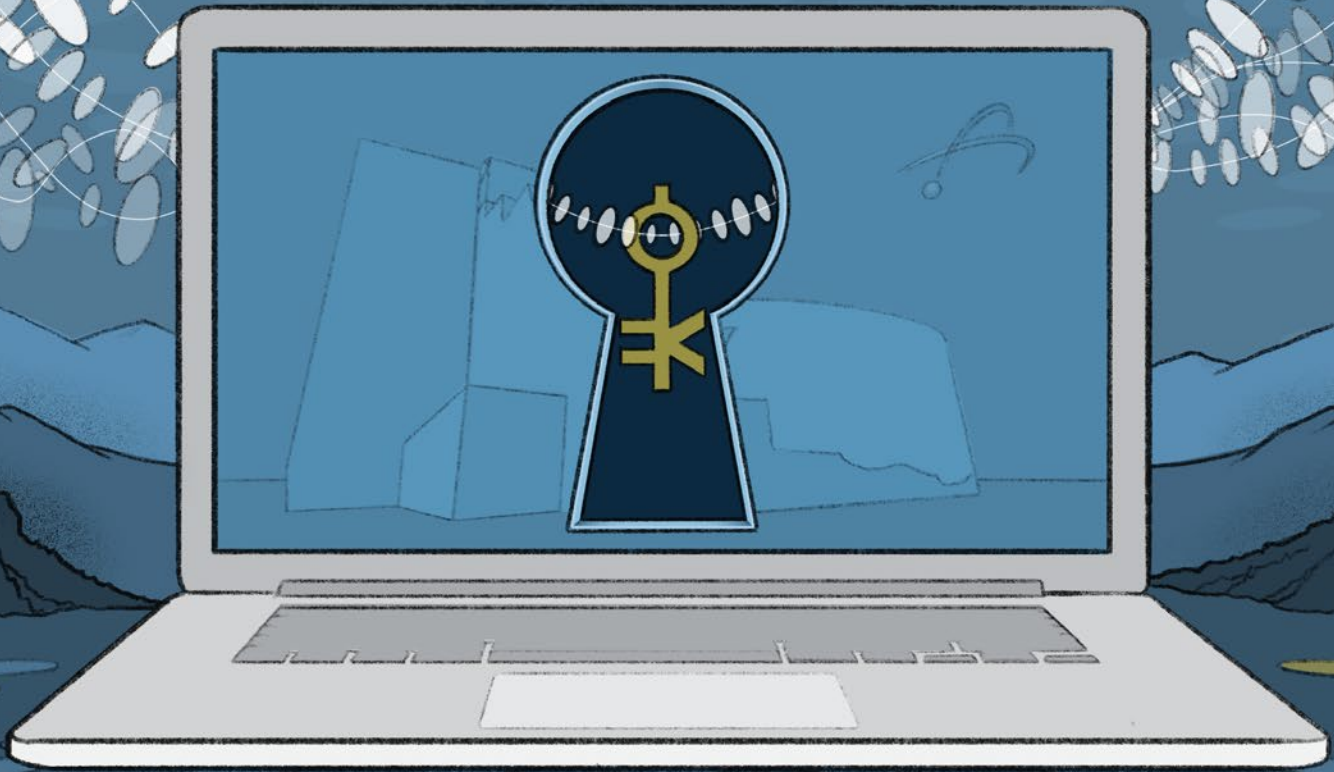


ADVANCING AMERICA *through* TECHNOLOGY TRANSFER

# LOS ALAMOS NATIONAL LABORATORY

**TRANSFORMING SECURE COMMUNICATIONS**



**QUANTUM CRYPTOGRAPHY**

**STRONGER KEYS, TRUSTWORTHY  
COMMUNICATIONS, *and* DEFENSE  
AGAINST EMERGING CYBER THREATS**

 **Los Alamos**  
NATIONAL LABORATORY  
EST. 1943

U.S. DEPARTMENT OF

**ENERGY**

Office of  
**TECHNOLOGY TRANSITIONS**



## How can quantum mechanics strengthen the foundation of computer security?

When scientists at Los Alamos National Laboratory (LANL) couldn't find a random number generator fast enough to handle the increasing demands of modern encrypted communications, they invented the Quantrandor.

A quantum random number generator, the Quantrandor relies on the unpredictable nature of quantum mechanics to generate an inexhaustible stream of truly random numbers and surpasses conventional software-based approaches by orders of magnitude. Using standard and low-cost photodetectors turned LANL's quantum "science project" into a larger quantum cryptography portfolio of technologies that commercializes entropy as a service and provides unprecedented defense against cybersecurity threats. Offering speed and security to industries spanning ecommerce to national security, LANL is fortifying the Nation's private communications for a quantum future.

### LANL at a Glance

Nestled between the mountains, canyons, and mesas of the American Southwest, Los Alamos traces its origins to 1943 as Site Y of the Manhattan Project, responsible for design and coordination of the entire program. LANL researchers, including J. Robert Oppenheimer and Richard Feynman, took just 27 months to successfully design, build, and test the world's first atomic bomb, protecting the Nation and promoting global stability. Today, LANL's world-class scientists and engineers secure the Nation by developing solutions that support nuclear deterrence and stockpile stewardship, defend against nuclear threats, detect emerging cybersecurity threats, and enhance energy security and sustainability.

### U.S. Department of Energy National Laboratories

The 17 U.S. Department of Energy (DOE) National Laboratories comprise a preeminent federal research system that executes long-term government scientific and technological missions, often with complex security, safety, project management, or other operational challenges. The National Laboratory system produces the scientific research needed to develop national energy policy and solutions allowing DOE to be one of the largest supporters of technology transfer in the federal government.

### Technology Transitions

The mission of the Office of Technology Transitions (OTT) is to expand the commercial impact of the DOE's research and development portfolio to advance the economic, energy, and national security interests of the Nation. The office develops the Department's policy and vision for expanding the commercial impact of its research investments, and streamlines information and access to DOE's National Labs and sites to foster partnerships that will move innovations from the labs into the marketplace.

[www.energy.gov/technologytransitions](http://www.energy.gov/technologytransitions)

## Quantrandor offers truly unpredictable random numbers at unprecedented rates

### Technology

The Quantrandor generates 200 megabits of random numbers per second.

### Industry

The Quantrandor utilizes readily available, low cost, plug-and-play components.

### Demonstration

Using LANL's power control center as a test-bed of the quantum cryptography portfolio's capability, scientists demonstrated command links controlling Los Alamos's electrical power distribution were impervious to interception and spoofing.

### Contact Us

The scientific discovery highlighted on this poster is just one of DOE's many successes advancing America.

Learn more about available resources and partnering opportunities with the National Labs by visiting:

[www.energy.gov/technologytransitions](http://www.energy.gov/technologytransitions)

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